



## **Summary of Fishery Surveys**

### **Chequamegon Waters Flowage (Miller Dam), Taylor County, 2013-2014**

WDNR and the USFS Fisheries Management Teams from Park Falls completed fyke netting and electrofishing surveys in 2013 and 2014 to assess the status of important fish populations in Chequamegon Waters Flowage. Fyke netting in October 2013 yielded useful information on black crappies. Fyke nets set shortly after the spring thaw targeted walleye and northern pike. A late-spring electrofishing survey documented the abundance and size structure of largemouth bass and bluegill populations. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society. “Keeper size” is based on known angler behavior.

### **Survey Effort**

On October 14, 2013 we set eight fyke nets and fished them overnight for two nights to characterize crappie population status. The water temperature was 54°F.

On April 24, 2014 we set eight fyke nets at locations chosen to intercept early spring spawners and fished them overnight for two nights. Nets were set one day after ice-out when water temperatures were 40 – 46°F. Our survey was well-timed to assess northern pike and walleye size and abundance.

With water temperatures 73 – 77°F, our early June electrofishing survey was a little late to represent the relative abundance and size structure of largemouth bass and bluegill populations during their peak spawning activities. Two crews sampled 5.00 shoreline miles in 1.97 hours, including 2.00 miles sub-sampled for panfish in 0.82 hour. In most cases we duplicated the netting sites and electrofishing routes sampled in 2006 and 2010.

### **Habitat Characteristics**

Chequamegon Waters Flowage is a 2714-acre impoundment on the Yellow River and the largest water body in Taylor County. Maximum depth is 22 feet, average depth is five feet, and 39% of the reservoir is less than three feet deep. Bottom materials in the shallow area near shore are mostly muck (80%) with smaller amounts of sand (10%) and gravel (10%). The fine particles underlying extensive portions of the reservoir provide substrate for larval insects (important food for many fish species), wild rice, and 27 other aquatic plant species. Tannins, lignins, and other organic compounds draining from wetlands contribute brown-stained water to the flowage. Abundant algae can contribute to low water clarity during the open-water season. Low water clarity inhibits light penetration and limits the maximum depth where rooted aquatic plants can grow (six feet in Miller Dam). The flowage is classified as highly eutrophic. Eutrophic waters are enriched with nutrients, making them very fertile and productive biologically. Lasting thermal stratification is rare in such a shallow wind-swept reservoir, but during calm periods in summer the lower 6 to 10 feet of the water column often have reduced dissolved oxygen levels.

## Summary of Results

We captured 15 fish species in our 2013 – 2014 netting and electrofishing surveys compared to 16 found in 2010. Species diversity was typical of fish communities in shallow and fertile impoundments on medium-size rivers. Northern pike and largemouth bass were the dominant predators, and their primary prey was perch, bluegills, and crappies. Abundant golden shiners and young bullheads complemented the forage base. Panfish and bullheads were too numerous to measure or count in early spring nets.

### Walleye

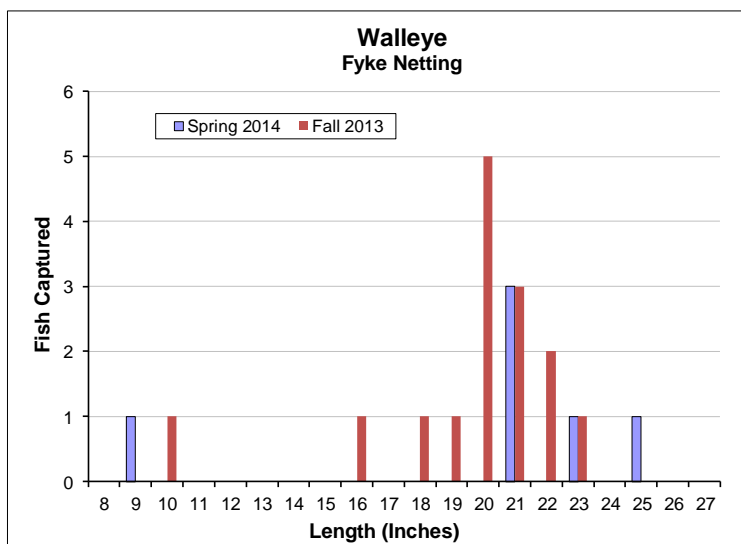


#### Early Spring Nets

Captured	0.3 per net-night	≥ 10"
Quality Size ≥ 15"	100%	
Preferred Size ≥ 20"	100%	
Memorable Size ≥ 25"	20%	

#### Fall Nets

Captured	0.9 per net-night	≥ 10"
Quality Size ≥ 15"	93%	
Preferred Size ≥ 20"	73%	
Memorable Size ≥ 25"	0%	



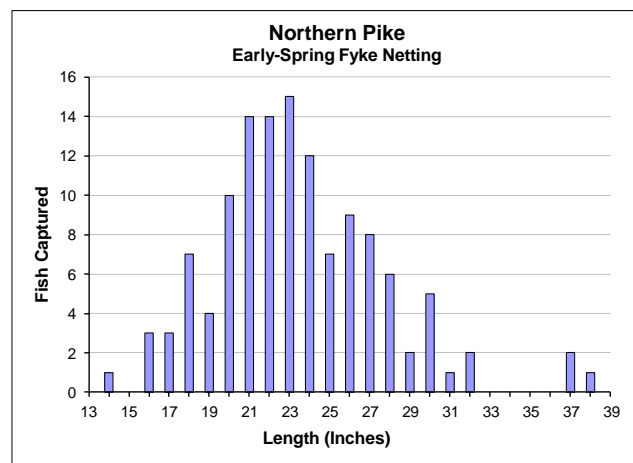
Netting surveys indicated satisfactory survival and fast growth of 6- to 8-inch walleyes purchased by Miller Dam Lake Association and stocked annually since 2007 at a rate of ½ fingerling per acre to establish and maintain a “bonus” fishery. In spring and fall netting surveys walleyes surpassed the benchmark in the *2006 Fishery Management Plan* that 20 – 40% should be 20 inches or longer. Though we did not and probably will not estimate population density, fyke net capture rates point toward the desired low level of abundance. Our targeted capture rate of walleyes in early spring fyke nets was one-third the incidental rate in fall nets, perhaps because adults moved to seek suitable spawning habitat in the Yellow River, or possibly because ice anglers kept many walleyes ≥ 15” between our surveys. Though the fish community and habitat in Chequamegon Waters are not particularly well-suited to sustain a walleye population by natural reproduction, the Lake Association’s stocking strategy should not only offer anglers opportunity to occasionally catch a walleye, but also add effective predatory pressure to help control panfish abundance and maintain satisfactory size structure of bluegills and black crappies—both highly regarded by Miller Dam anglers.

## Northern Pike



### Early Spring Fyke Nets

Captured 7.9 per net-night $\geq 14"$	
Quality Size $\geq 21"$	78%
Preferred Size $\geq 28"$	15%
Memorable Size $\geq 34"$	2%



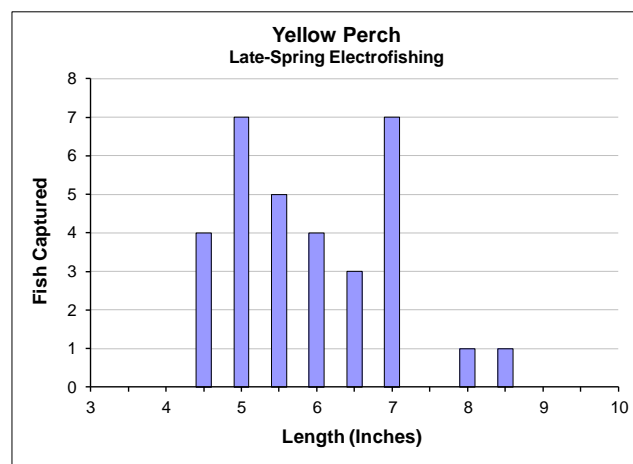
Early spring fyke nets captured northern pike at a slightly lower rate in 2014 than in 2010 (8 versus 11 pike per net-night), but both surveys reflected moderately high population abundance. Percentages of quality- and preferred-size pike increased slightly from 2010 when 68% were 21 inches or longer and 11% were at least 28 inches long. This minor improvement may be associated with a corresponding small increase in the abundance of yellow perch, pike's favorite food. Proportions of memorable-size pike  $\geq 34$  inches remained stable at 2 – 3%, even though fishing pressure directed toward pike is perceived to be high. Because the population meets or exceeds its size objectives ( $5 - 10\% \geq 28"$  and  $1 - 2\% \geq 34"$ ), current management under statewide harvest regulations is adequate, and no changes are anticipated at this time. If pike grow as fast as we suspect in this fertile system, restricting the harvest of large fish with a high minimum length limit could reveal Miller Dam's potential to produce trophy-size northern pike 44 inches and longer.

## Yellow Perch



### Late-Spring Fyke Nets

Captured 14 per mile or 34 per hour $\geq 5"$	
Quality Size $\geq 8"$	7%
Preferred Size $\geq 10"$	0%
Memorable Size $\geq 12"$	0%



As the preferred food of northern pike, largemouth bass, and walleyes, yellow perch play an important role in structuring fish community. We did not measure or count panfish in 2014 fyke nets, but early spring 2010 fyke nets captured only 1.2 perch  $\geq 5$  inches per net-night, a rate indicative of low perch abundance. Low electrofishing capture rates in late spring 2010 and 2014 also suggest that few perch survive the myriad of predators, though we are not sure how to interpret those results. The nearly three-fold increase in perch captured per mile of electrofishing effort from 2010 to 2014 may be attributed to

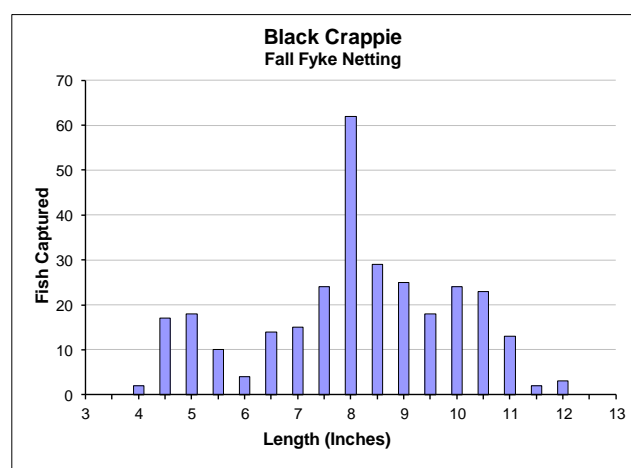
sampling variability, rather than an actual increase in perch abundance. Aside from our uncertainty about perch abundance, we found very few perch of the sizes that anglers prefer to keep. The scarcity of perch longer than 8 inches may result from size selective predation by northern pike, which typically eat more perch and larger perch in relation to their own increasing size. If yellow perch are as rare as our surveys suggest, northern pike at moderately high density and in good (apparent) condition are the probable cause of poor recruitment, very low abundance, and poor size structure in the yellow perch population. Anglers may occasionally take a few perch that were fortunate enough to evade predators and grow to keeper-size  $\geq 9$  inches, but more restrictions on harvest will probably not improve the population's size structure. Perch of all sizes should continue to serve as the fundamental food of sport fish with higher importance to Miller Dam anglers.

## Black Crappie



Fall Fyke Nets

Captured 18 per net-night $\geq 5$ "	
Quality Size $\geq 8$ "	70%
Preferred Size $\geq 10$ "	23%
Memorable Size $\geq 12$ "	1%



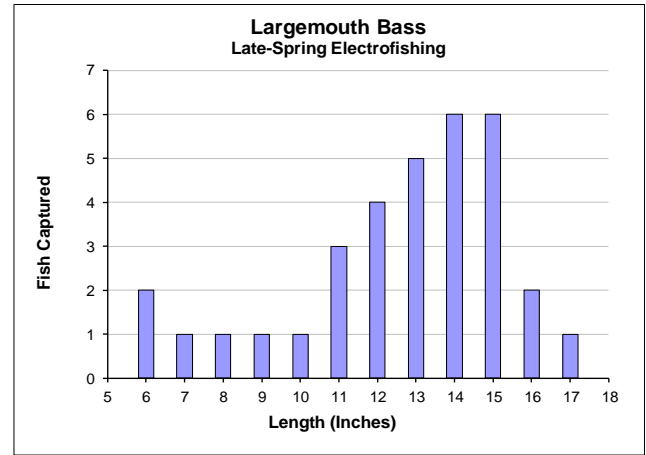
Our capture rate of black crappies in fall fyke nets was near the upper end of the objective range (10 – 20 crappies per net-night) selected to represent the desired moderate population abundance—an increase of more than 4 times the capture rate in spring and fall 2010 fyke nets. Increased abundance can be attributed to the strong 2010 year class (presumed age), represented in fall 2013 by crappies 7.5 – 8.5 inches long. The wide range of sizes indicates reliable recruitment with no missing year classes, so angler can expect uninterrupted angling opportunity in foreseeable years. In our fall 2006, 2010, and 2013 surveys black crappies did not attain the desired size objective (30 – 50% at least 10 inches long). Age analysis using scales taken in fall 2010 revealed that mid-size crappies grew slower than average, so it is difficult to predict whether the 2010 year class will survive long enough to improve the population's size structure before the oldest crappies succumb to angling or natural causes of mortality. Our results reflect the cyclic nature of crappie populations whose abundance can vary with reproductive success and decline abruptly when anglers selectively harvest a high percentage of the largest adults. Fluctuations in crappie abundance related to harvest will probably continue under moderately heavy fishing pressure, but a proposal that would allow anglers to keep up to 5 sunfish, 5 crappies, and 5 perch (or 15 panfish daily) in May and June and 25 panfish daily the rest of the time may serve to increase the percentages of preferred-size bluegills and black crappies and distribute the harvest more equitably among anglers and years.

## Largemouth Bass



### Late Spring Electrofishing

Captured 6.0 per mile or 15 per hour $\geq 8"$	
Quality Size $\geq 12"$	80%
Preferred Size $\geq 15"$	30%
Memorable Size $\geq 20"$	0%



Consistent with reports of declining bass angling opportunity in Chequamegon Waters Flowage, late spring electrofishing captured largemouth bass at similarly low rates in 2014 and 2010 (15 and 17 bass  $\geq 8"$ , respectively) with both measures falling far short of the goal for moderate population density (40 – 60 bass per hour). Proportions of preferred-size largemouth bass were also nearly identical in 2010 and 2014 (30% and 29%, respectively), but the share of memorable-size bass  $\geq 20$  inches declined from 2.2% in 2010 (Goal = 2 – 4%) to none in 2014. Possible causes for lower-than-desired largemouth bass abundance include intense competition and predation from dominant northern pike. Additionally, various physiological stressors often associated with prolonged periods of very low dissolved oxygen concentration in late winter, including fungal and bacterial infection, may have compromised the fitness and survival of largemouth bass in this fertile impoundment, despite the lake association's annual effort to provide an open-water refuge by lake aeration.

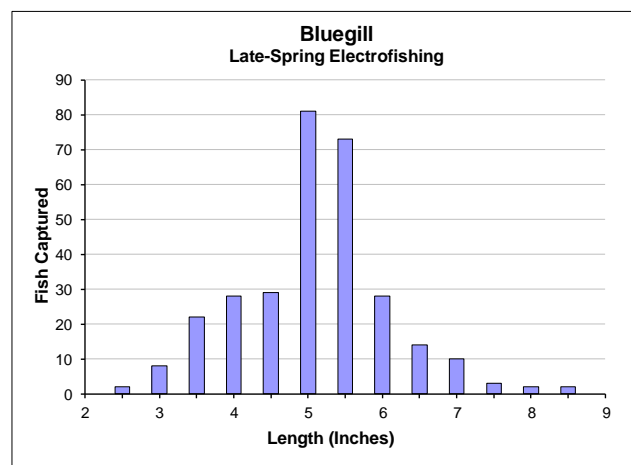
For age analysis, we removed and cross-sectioned otoliths (ear bones) from 9 largemouth bass 11.6 – 17.6 inches long that we found dead or dying in our nets and retained for viral testing and to assess the human health effects of mercury accumulated in their edible flesh. Though samples were small in all length classes, counts of annular rings on otoliths revealed average or better-than-average growth in 2014 compared to the slower-than-average rate indicated by ages estimated from scales taken in 2010. Largemouth bass grew to 12.4 inches in 4 years ( $n = 3$ ) and 14.5 inches in 6 years ( $n = 3$ ), 1.4 inches longer and 0.1 inch shorter than the regional average length at those ages. Lab results were negative for three viral pathogens to which largemouth bass are known to be susceptible. Transport of fresh, unfrozen specimens could not be arranged in time to test for suspected bacterial infections. Specific safe-eating advice will be published in "*Choose wisely—a health guide for eating fish in Wisconsin*," if the pending assay reveals higher-than-expected levels of contaminants.

## Bluegill



### Late Spring Electrofishing

Captured 150 per mile or 366 per hour $\geq 3"$	
Quality Size $\geq 6"$	20%
Keeper Size $\geq 7"$	6%
Preferred Size $\geq 8"$	1%



Comparing the number of bluegills  $\geq 3"$  captured per mile of late spring electrofishing suggests that bluegill abundance has increased 38% from 2010 to 2014. Our capture rates per hour point to an even greater increase (78%), though this difference is exaggerated by faster electrofishing speed in 2014 when we covered the same 2-mile distance in 0.82 hour compared to 1.08 hours in 2010. Spring electrofishing surveys in 2010 and 2014 show that the bluegill population in Miller Dam Flowage did not have the desired moderate level of abundance (measured as 75 – 150 bluegills per hour of electrofishing) or the desired size structure (15 – 20%  $\geq 8"$  and 1 – 2%  $\geq 10"$  long). However, early spring fyke nets revealed larger proportions of keeper-size and preferred-size bluegills that were nearly absent from our electrofishing samples in both years. Nineteen percent of bluegills in spring 2010 fyke nets were at least 8 inches long, and though we did not measure or count panfish in our spring 2014 netting survey, the estimated share of preferred-size bluegills was similar to that quantified 4 years earlier. We do not know why early spring fyke nets captured larger bluegills that were undetected by late spring electrofishing. Despite higher-than-desired bluegill density, the shallow muddy flats of this fertile impoundment provide an ample source of invertebrate food (mainly insect larvae) that allows bluegills to grow faster than the regional average rate (based on age analysis of scales taken in 2010). Fishing pressure and panfish harvest are both perceived to be high in Chequamegon Waters Flowage, and undoubtedly anglers selectively take the largest bluegills from the population under current regulations that allow them to keep up to 25 panfish daily. To increase the proportion of bluegills 8 – 11 inches long, an experimental regulation proposed to take effect in 2016 would reduce the daily bag limit to 15 panfish in May and June when they are most vulnerable to angling. In those two months anglers could keep up to 5 sunfish, 5 crappies, and 5 perch in total. During the rest of the year the daily bag limit would be 25 panfish of any species combined. Netting and electrofishing surveys scheduled in 2018 and 2022 will be used to monitor any changes in bluegill size that may result from the proposed harvest restriction.

Survey data collected and analyzed by: Chad Leanna, Greg Rublee, Jeff Scheirer, Evan Sniadajewski, Skip Sommerfeldt, and Jeanette Wendler—USFS and WDNR Fishery Teams, Park Falls.

Written by: Chad Leanna—Fishery Technician and Jeff Scheirer—Fishery Biologist, December 2014.

Reviewed and approved for web posting by: Mike Vogelsang—acting Hayward Field Unit Supervisor, January 2015.